

University of Technology Sydney
Faculty of Science

**A Systematic Approach to
Designing, Implementing and
Evaluating Learner-Generated
Digital Media Assignments (LGDM)
in Undergraduate Science Students
and its Effect on Self-Regulation.**

A dissertation submitted in partial fulfilment of the
requirements for the degree of Doctor of Philosophy
(Science Education)

**Jorge Reyna
December 2019**

CERTIFICATE OF ORIGINAL AUTHORSHIP

I, **Jorge Reyna** declare that this thesis is submitted in fulfilment of the requirements for the award of Doctor of Philosophy, in the Faculty of Science at the University of Technology Sydney. This thesis is wholly my own work unless otherwise reference or acknowledged. Also, I certify that all information sources and literature used are indicated in the thesis.

This document has not been submitted for qualifications at any other academic institution.

This research is supported by the Australian Government Research Training Program.

Production Note:

Signature removed prior to publication.

Date: 03/28/2019

Acknowledgments

To my supervisor, Associate Professor Peter Meier for allowing me to implement my ideas the support and guidance provided during my candidature.

To Dr Jose Hanham (Western Sydney University) for his guidance, particularly in the first part of my research with the conceptual frameworks proposed.

To Associate Professor Panos Vlachopoulos (Macquarie University) for his initial guidance for designing the research and strategic input during the writing of the papers.

To all the wonderful subject coordinators and tutors who believed in Learner-Generated Digital Media (LGDM) assignments and decided to implement and provide me with an opportunity to try it in their subjects. Special thanks to Associate Professor Kenneth Rodgers, Associate Professor Sara Lal, Dr Ty Lees, Dr Francis Geronimo, Dr Hermily Geronimo, Associate Professor Shari Forbes, Dr Finbarr Horgan, Associate Professor Andrew McDonagh, Dr Mackenzie de la Hunty, Dr Yew Kian Loyeung, and Associate Professor Willa Huston.

To all my fantastic colleagues that I met since 2009 at educational technology conferences. The opportunity to present and receive feedback on my ideas was an amazing learning experience.

To Associate Professor Christine Woodrow (Western Sydney University) for the early intervention, she did make me realise I need it to pack and unpack my thoughts to further understand education.

To my beautiful family Jorge, Carmen, Camucha, and Celeste for being always with me. To my dearest friend Neil Caller (BBTo), Brett (Canga) Todd, Steve Mann, and Joanne Orlando for their constant support.

To all the people that came and gone into my life who taught me a lesson and made me the person I am. To the ones that challenged me and made me think differently.

To the ones that tried hard to put me down as they made me stronger to progress with my ideas.

To Peter the Proofer (Peter Krockenberger) for proofreading of journal papers before submission. His role was copy-editing for grammatical error, misspelling and consistency across journal papers. Peter can be contacted at www.petertheproofer.com.au

Table of Contents

Chapter 1: Introduction and overview

1.1	Background to the study.....	15
1.2	What is Learner-Generated Digital Media (LGDM)?.....	18
1.3	Advantages of LGDM as an assessment tool.....	19
1.4	Challenges to implementing LGDM as an assessment tool.....	20
1.5	Theoretical underpinnings of LGDM.....	22
1.6	Frameworks to implement LGDM in the classroom.....	25
1.7	Purpose of the study.....	26
1.8	Statement of the problem.....	26
1.9	Aims of This Study.....	27
1.10	Ethical clearance considerations.....	29
1.11	Delimitations.....	29
1.12	Overview of the thesis.....	31

Chapter 2: Literature Review

Reyna, J., & Meier, P. (2018). Learner-Generated Digital Media (LGDM) as an Assessment Tool in Tertiary Science Education: A Review of Literature. <i>IAFOR Journal of Education</i>, 6(3). https://doi.org/10.22492/ije.6.3.06.....	40
---	-----------

Chapter 3: Theoretical considerations for LGDM assignments and exploratory study

Reyna, J., Hanham, J., & Meier, P. C. (2018). A framework for digital media literacies for teaching and learning in higher education. <i>E-Learning and Digital Media</i>, Vol 15(4), 176-190. https://doi.org/10.1177/2042753018784952.....	64
Reyna, J., Hanham, J., Meier, P (2018). A taxonomy of digital media types for Learner-Generated Digital Media assignments. <i>E-learning & Digital Media</i>, Vol. 14(6) 309–322. https://doi.org/10.1177/2042753017752973.....	79

Reyna, J., Hanham, J., Meier, P (2018). The Internet Explosion, Digital Media Principles and Implications to Communicate Effectively in the Digital Space. *E-learning & Digital Media*, Vol 15(1), pp. 36 – 52. <https://journals.sagepub.com/doi/10.1177/2042753018754361>..... 93

Reyna, J., Meier, P (2018). A Practical Model for Implementing Digital Media Assessments in Tertiary Science Education. *American Journal of Educational Research*, 6(1):27-31. [10.12691/education-6-1-4](https://doi.org/10.12691/education-6-1-4)..... 110

Reyna, J., & Meier, P. (2018). Using the Learner-Generated Digital Media (LGDM) Framework in Tertiary Science Education: A Pilot Study. *Education Sciences*, 8(3), 106 <http://dx.doi.org/10.3390/educsci8030106>..... 115

Chapter 4: Materials and Methods

Reyna, J., Hanham, J. & Meier, P. (2018). A Methodological Approach to Evaluate the Effectiveness of Learner-Generated Digital Media (LGDM) Assignments in Science Education. In T. Bastiaens, J. Van Braak, M. Brown, L. Cantoni, M. Castro, R. Christensen, G. Davidson-Shivers, K. DePryck, M. Ebner, M. Fominykh, C. Fulford, S. Hatzipanagos, G. Knezek, K. Kreijns, G. Marks, E. Sointu, E. Korsgaard Sorensen, J. Viteli, J. Voogt, P. Weber, E. Weippl & O. Zawacki-Richter (Eds.), *Proceedings of EdMedia: World Conference on Educational Media and Technology* (pp. 303-314). Amsterdam, Netherlands: Association for the Advancement of Computing in Education (AACE). <https://www.learntechlib.org/primary/p/184211/>..... 143

Reyna, J., Hanham, J., Vlachopoulos, P., & Meier, P. (2019). Using factor analysis to validate a questionnaire to explore self-regulation in learner-generated digital media (LGDM) assignments in science education. *Australasian Journal of Educational Technology*, 35(5), 128-152. <https://doi.org/10.14742/ajet.4514>..... 155

Chapter 5: Study of self-regulation in LGDM assignments

Reyna, J., Hanham, J., Vlachopoulos, P., & Meier, P. (2019). A Systematic Approach to Designing, Implementing, and Evaluating Learner-Generated Digital Media (LGDM) Assignments and Its Effect on Self-Regulation in Tertiary Science Education.

Res Sci Educ, 1-27. <https://doi.org/10.1007/s11165-019-09885-x>..... 185

Chapter 6: Discussion and conclusions

6.1 The need to develop models for digital media literacies for teaching and learning.....	213
6.2 Theoretical frameworks developed to inform LGDM assignments.....	216
6.3 Self-regulation and LGDM assignments.....	219
6.4 Methodological triangulation.....	221
6.5 Conclusion.....	224
6.6 Limitations of the study.....	226
6.7 Recommendations for practice and research.....	229

Chapter 7: Additional paper

Reyna, J. (2019). Theoretical Foundations to Design Learner-Generated Digital Media (LGDM) Assessment Rubrics. In K. Graziano (Ed.), *Proceedings of Society for Information Technology & Teacher Education International Conference* (pp. 1380-1389). Las Vegas, NV, United States: Association for the Advancement of Computing in Education (AACE). <https://www.learntechlib.org/primary/p/207827/>..... 241

References..... 248

Appendix..... 266

Other publications not included in this thesis

Peer-reviewed industry magazine

Reyna, J (2018). Learners as Co-Creators of Knowledge Using Digital Media. In: Curation vs Creation. *Training & Development* magazine, March 2018 Vol 45 No 1, published by the Australian Institute of Training and Development.

Peer-reviewed conference papers

Reyna, J (2019). A Model to Explore Learning Processes in Learner-Generated Digital Media (LGDM) Assignments. *Exploring New Frontiers in Education*. The 13th annual International Technology, Education and Development Conference, INTED2019, Valencia (Spain), March 11th-13th.

Reyna, J & Meier, P (2019). Self-Regulation Processes in Learner-Generated Digital Media (LGDM) Assignments. *Exploring New Frontiers in Education*. The 13th annual International Technology, Education and Development Conference, INTED2019, Valencia (Spain), March 11th-13th.

Reyna, J (2018). Theoretical Considerations to Design Learner-Generated Digital Media (LGDM) Assignments in Higher Education. Rethinking Learning in a Connected Age. The 12th annual International Technology, Education and Development Conference, INTED2018, Valencia (Spain), March 5th-7th.

Reyna, J., Horgan, F., Ramp, D., & Meier, P (2017). Using Learner-Generated Digital Media (LGDM) as an Assessment Tool in Geological Sciences. The 11th annual International Technology, Education and Development Conference, INTED2017, Valencia (Spain), March 6th-8th.

Abstracts

Reyna, J., Hanham, J., Meier, P., Geronimo, F (2017). Exploring Self-Regulation in Learner-Generated Digital Media (LGDM) Assignments in First Year Science Students. Australian Association for Research in Education (AARE) Conference. Canberra, ACT. Nov 26th – 30th.

Posters

Reyna, J., Hanham, J., Meier, P (2017). Learning workflow using learner-generated digital media (LGDM) assignments. In H. Partridge, K. Davis, & J. Thomas. (Eds.), Me, Us, IT! Proceedings ASCILITE2017: 34th International Conference on Innovation, Practice and Research in the Use of Educational Technologies in Tertiary Education (pp. 57-62).

Reyna, J., Meier, P., Hanham, J., Vachopoulos, P & Rodgers, K (2017). Learner-Generated Digital Media (LGDM) Framework. Poster presented at the 11th annual International Technology, Education and Development Conference, INTED2017, Valencia (Spain), March 6th-8th.

Abstract

This study aimed to address the need for a systematic approach to LGDM assignments identified in the literature. The author proposed a set of four theoretical frameworks to design, implement, and evaluate LGDM tasks in science education. The Digital Media Literacies framework informed the development of training materials and marking rubrics. The Taxonomy of Digital Media Types guided the assessment weight and communicated to students and academics of the different media types available according to skills required for their production. The Digital Media Principles framework identified the standards the students and educators need to achieve to communicate effectively in the digital space. The LGDM Implementation framework guided the design, development, implementation and evaluation of digital media assignments in the classroom. A pilot study trialled these frameworks and validated an evaluation survey for LGDM assignments (Spring 2016). The students reported a positive attitude toward digital media for learning, highlighted creativity, teamwork, digital media support, and learning of subject content as the main features of the intervention.

The second part of the dissertation focused on the development of an additional framework to research student learning experience with LGDM assignments. It followed a mixed-methods approach, and the quantitative data section validated a self-regulation questionnaire, suggested to capture LMS logs, marks, and group contribution data. The qualitative part included open-ended questions and student interviews.

The last part of the dissertation included a large trial ($n=1,687$) across seven science subjects (Autumn, 2017). The aim was to gauge the utility of the theoretical frameworks proposed by answering research questions such as: *are the students self-regulating their learning when LGDM assignment design follows a systematic approach?* and; *how does a systematic approach guided by theoretical frameworks impact the overall student learning experience with LGDM assignments?* The students received LGDM training online and in a blended mode, and both groups showed a high score of self-regulation beliefs, being higher for online learners and female participants. Triangulating

the rest of the data sets found that students had a positive learning experience and answered the research questions proposed.

The contribution of this research has many implications. For practitioners, it offers a set of practical frameworks to guide the design, development and implementation of LGDM assignments. For researchers, the development of the theoretical framework to research the learning experience with LGDM assignments is the starting point to understand further a field considered under-theorised, under-researched and in early stages.

